

Site: Soybean					Overall Confidence Rating: High			
Background: A total of 70,850,000 acres are planted in soybeans in the United states. Production is limited to the Eastern and Central U.S. with Northern acres accounting for 75.5% of total production. Top soybean production states are Illinois and Indiana. Organophosphate pesticides (OP) represent 42% of all pesticide usage on this crop with an average of 1.1 applications per year. Analysis of OP usage was conducted for two regions; Northern U.S. (IL, IN, IA, KS, KY, MI, MN, MO, NE, NJ, ND, OH, PA, SD, and WI) and Southern U.S. (AL, AR, De, FL, GA, LA, MD, MS, NC, OK, SC, TN, TX, and VA). Insecticide use patterns and key pests vary between regions largely as a result of the inability of some insects to overwinter in the northern U.S. Typically only 2.5% of all soybean acreage is treated annually with insecticides.								
Organophosphate Pesticides	% Treated		# Applications		Rate (lb AI/A)		PHI (days)	
	Max <sup>10</sup>	Avg <sup>10</sup>	Max <sup>8</sup>	Avg <sup>10</sup>	Max <sup>8</sup>	Avg <sup>10</sup>	Min <sup>8</sup>	Avg <sup>2</sup>
acephate	< 1	0	NS	---	0.99	0.5	14	---
azinphos-methyl	< 1	0	NS	---	0.75	---	45	---
chlorpyrifos	3	<1	NS	1	3.33	0.7	28	---
diazinon	---	---	NS	---	4.00	---	---	---
dimethoate	1	<1	NS	---	0.5	---	21	---
disulfoton	< 1	0	NS	1	1.01	2	75	---
malathion	< 1	0	NS	1	2.0	0.3	7	---
methyl parathion	<1	0.1	2	---	1.02	---	30	---
phorate	<1	0	NS	---	4.9	---	---	---

Confidence Rating: H= high confidence = data from several confirming sources; confirmed by personal experience

M = medium confidence = data from only a few sources; may be some conflicting or unconfirmed info.

L = low confidence = data from only one unconfirmed source

Organophosphate Target Pests for Soybean in Northern U.S. (Primary pests controlled by the OP's) <sup>2, 3, 4, 5</sup>	
Major	Bean leaf beetle, Leafhopper (Potato and Three-cornered Alfalfa), Grasshopper
Moderate	Thrips
Minor	Cutworms

Major = 20+% of all OP usage on pest; Moderate = 5-20% of all OP usage on pest; Minor =<5% of all OP usage on pest

Organophosphate Target Pests for Soybean in the Southern U.S. (Primary pests controlled by the OP's) <sup>2, 6, 7</sup>	
Major	Stink Bug,
Moderate	Looper (Cabbage, Alfalfa, and Soybean), Corn Ear Worm/Bud Worm
Minor	Armyworm (Beet), Grasshopper

Major = 20+% of all OP usage on pest; Moderate = 5-20% of all OP usage on pest; Minor =<5% of all OP usage on pest

**Sources:**

1. Proprietary EPA market share information 1994-1996.
2. QUA+ - Indiana, Illinois, Georgia, Florida, Louisiana. 1997.
3. Field Crop Insects - Soybean Insect Control Recommendations. 1997. Purdue University Cooperative Extension Service. E-77.
4. 1995 Insect Pest Management Guide for Iowa Field and Forage Crops. 1995. Iowa State University Extension. IC-474.
5. Insect and Disease Management-Field Crops, Forages and Livestock. 1996. University of Missouri-Columbia, University Extension. M 160.
6. Soybean Insect Management. 1996. Mississippi State University - Cooperative Extension Service. Publication 883.
7. 1998 Insecticide Recommendations for Arkansas. 1998. University of Arkansas - Cooperative Extension Service. MP 144.
8. Label Use Information System (LUIS) Version 5.0, EPA.
9. The All-Crop, Quick Reference Insect Control Guide (1997), Meister Publishing Company
10. EPA Internal QUA Data.

Date: 8/26/98

Site: Soybean

Region: Southern (AL, AR, DE, FL, GA, LA, MD, MS, NC, OK, SC, TN, TX, and VA)

Pest <sup>2, 3, 4</sup>	Organophosphate <sup>1, 2, 3, 4, 5, 6</sup>	Efficacy	Mkt <sup>1</sup>	Class	Alt. Pesticide List <sup>1, 2, 3, 4, 5</sup>	Efficacy	Mkt <sup>1</sup>	Constraints of Alternatives <sup>2</sup>
Timing: Post-Emergence								
Stink Bug (Major)	acephate	---	Lo	C	carbaryl	---	Lo	
	azinphos-methyl	---	Lo	C	carbofuran	---	Lo	
	malathion	---	Lo	C	methomyl	---	Lo	
	methyl parathion	---	High	C	thiodicarb	---	Lo	
				P	esfenvalerate	---	Lo	
				P	lambda-cyhalothrin	---	Lo	
				P	permethrin	---	Lo	
				P	tralomethrin	---	Lo	
				CH	endosulfan	---	Med	
				CH	methoxychlor	---	Lo	
				IGR	diflubenzuron	---	Lo	
Looper (Cabbage, Alfalfa, and Soybean) (Moderate)	acephate	---	Med	C	carbaryl	---	Lo	
	chlorpyrifos	---	Lo	C	methomyl	---	Med	
	malathion	---	Lo	C	thiodicarb	---	Med	
	methyl parathion	---	Lo	P	esfenvalerate	---	Lo	
				P	lambda - cyhalothrin	---	Lo	
				P	permethrin	---	Med	
				P	tralomethrin	---	Lo	

Pest Importance: Major = 20+% of all OP usage on pest; Moderate = 5-20% of all OP usage on pest; Minor = &lt;5% of all OP usage on pest

Efficacy Rating: Excellent = ☺ Good = ○ Fair = ●

Market Share: High = use of OP represents 20+% of all insecticide usage on pest; Med = 5-20% of all usage on pest; Lo = &lt;5% of all usage on pest

Insecticides: C = Carbamates; P = Pyrethroids; CH = Chlorinated Hydrocarbons; IGR = Insect Growth Regulators; B = Biological; O = Other pesticides

Site: Soybean

Region: Southern (AL, AR, DE, FL, GA, LA, MD, MS, NC, OK, SC, TN, TX, and VA)

Pest <sup>2, 3, 4</sup>	Organophosphate <sup>1, 2, 3, 4, 5, 6</sup>	Efficacy	Mkt <sup>1</sup>	Class	Alt. Pesticide List <sup>1, 2, 3, 4, 5</sup>	Efficacy	Mkt <sup>1</sup>	Constraints of Alternatives <sup>2</sup>
Timing: Post-Emergence								
				CH	endosulfan	---	Lo	
				IGR	diflubenzuron	---	Lo	
				B	Bacillus thuringiensis	---	High	
Corn Ear Worm/Bud Worm  (Moderate)	acephate	---	Lo	C	carbaryl	---	Med	
	chlorpyrifos	---	Lo	C	methomyl	---	Med	
	disulfoton	---	Lo	C	thiodicarb	---	Med	
	malathion	---	Lo	P	esfenvalerate	---	Med	
	methyl parathion	---	Med	P	lambda - cyhalothrin	---	Med	
	phorate	---	Lo	P	permethrin	---	Med	
				P	tralomethrin	---	Lo	
				CH	endosulfan	---	Lo	
				IGR	diflubenzuron	---	Lo	
				B	Bacillus thuringiensis	---	Lo	
Armyworm (Beet)  (Minor)	acephate	---	Lo	C	carbaryl	---	Lo	
	chlorpyrifos	---	Lo	C	methomyl	---	High	
	malathion	---	Lo	C	thiodicarb	---	Med	
	methyl parathion	---	Lo	P	esfenvalerate	---	Med	
	phosmet	---	Lo	P	lamda-cyhalothrin	---	Med	

Pest Importance: Major = 20+% of all OP usage on pest; Moderate = 5-20% of all OP usage on pest; Minor = &lt;5% of all OP usage on pest

Efficacy Rating: Excellent = ☺ Good = ○ Fair = ●

Market Share: High = use of OP represents 20+% of all insecticide usage on pest; Med = 5-20% of all usage on pest; Lo = &lt;5% of all usage on pest

Insecticides: C = Carbamates; P = Pyrethroids; CH = Chlorinated Hydrocarbons; IGR = Insect Growth Regulators; B = Biological; O = Other pesticides

Site: Soybean

Region: Southern (AL, AR, DE, FL, GA, LA, MD, MS, NC, OK, SC, TN, TX, and VA)

Pest <sup>2, 3, 4</sup>	Organophosphate <sup>1, 2, 3, 4, 5, 6</sup>	Efficacy	Mkt <sup>1</sup>	Class	Alt. Pesticide List <sup>1, 2, 3, 4, 5</sup>	Efficacy	Mkt <sup>1</sup>	Constraints of Alternatives <sup>2</sup>
Timing: Post-Emergence								
				P	permethrin	---	High	
				P	tralomethrin	---	Lo	
				CH	endosulfan	---	Lo	
				CH	methoxychlor	---	Lo	
				IGR	diflubenzuron	---	Med	
				B	Bacillus thuringiensis	---	Med	
Grasshopper (Minor)	acephate	---	Lo	C	carbaryl	---	Med	
	chlorpyrifos	---	Lo	C	carbofuran	---	Med	
	dimethoate	---	Med	C	methomyl	---	Lo	
	methyl parathion	---	High	P	esfenvalerate	---	Lo	
	phosmet	---	Lo	P	lambda-cyhalothrin	---	Med	
				P	permethrin	---	Lo	
				CH	endosulfan	---	Lo	
				B	Bacillus thuringiensis	---	Med	

**ADDITIONAL INFORMATION:<sup>2</sup>**

Chemical application is currently the only method of controlling stink bugs in soybean. While successful biological control of stink bug has been observed in several parts of the world, releases of parasites in the U.S. has not reduced stink bug to sub-economic levels. Natural parasites of the stink bug produce only 25-50% control whereas application of methyl parathion can achieve 90% control. Feeding activity of the stink bug may cause underdeveloped pods to abort and may also inoculate pods with yeast bud disease organisms. In addition, damaged beans have poorer milling quality, less vigor and reduced germination. Discounts due to stink bug damage are determined at one-fourth of the actual percentage of damaged seeds. Studies indicate that an average of one stink bug per foot of row reduces soybean yield 10%.

Pest Importance: Major = 20+% of all OP usage on pest; Moderate = 5-20% of all OP usage on pest; Minor = <5% of all OP usage on pest

Efficacy Rating: Excellent = ☺ Good = ○ Fair = ●

Market Share: High = use of OP represents 20+% of all insecticide usage on pest; Med = 5-20% of all usage on pest; Lo = <5% of all usage on pest

Insecticides: C = Carbamates; P = Pyrethroids; CH = Chlorinated Hydrocarbons; IGR = Insect Growth Regulators; B = Biological; O = Other pesticides

**Site: Soybean**

**Region: Southern (AL, AR, DE, FL, GA, LA, MD, MS, NC, OK, SC, TN, TX, and VA)**

**SOURCES:**

1. Proprietary EPA market share information 1994-1996.
2. QUA+ - Florida, Georgia, and Louisiana. 1997.
3. Soybean Insect Management. 1996. Mississippi State University - Cooperative Extension Service. Publication 883.
4. 1998 Insecticide Recommendations for Arkansas. 1998. University of Arkansas - Cooperative Extension Service. MP 144.
5. The All-Crop, Quick Reference Insect Control Guide (1997), Meister Publishing Company.
6. Label Use Information System (LUIS) Version 5.0, EPA.

Date: 8/26/98